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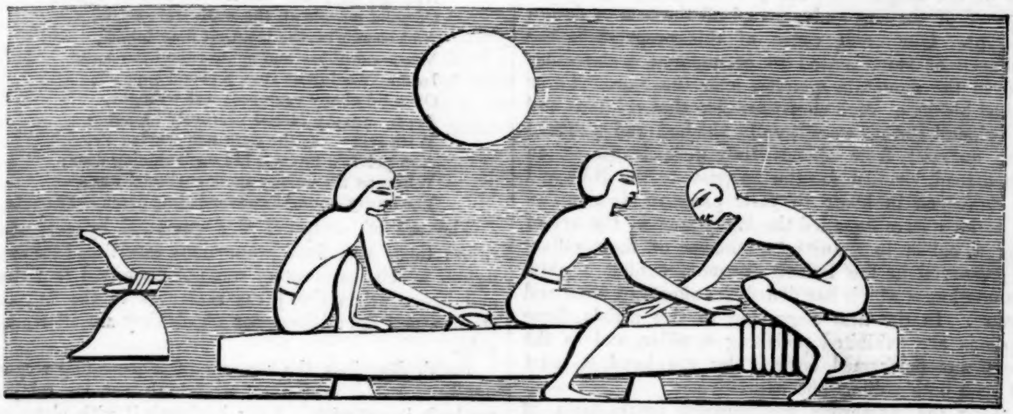
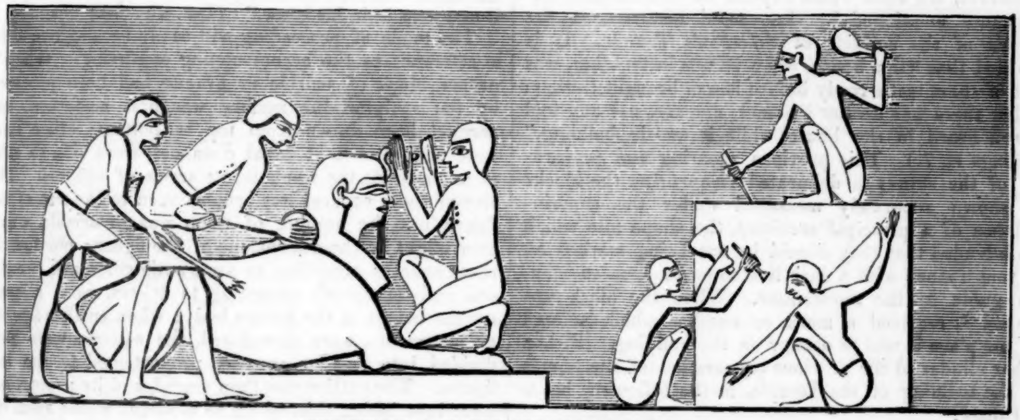
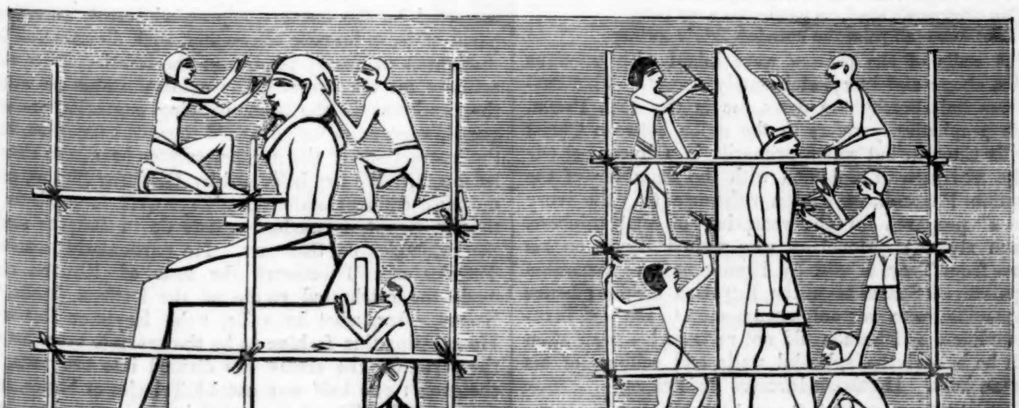
ANTIENT EGYPTIAN SCULPTURE.



ANTIENT EGYPTIANS POLISHING A PILLAR.



SCULPTURING A STATUE AND SQUARING STONES.



COLOSSAL STATUARY.

EGYPTIAN SCULPTURE.

THE prohibition against the use of images in the second commandment prevented the Hebrews from devoting much attention to the arts of sculpture and painting; ornamental details in architecture were similarly neglected until the erection of David's palace and Solomon's Temple; indeed, the principal artists employed in both these structures appear to have been brought from Phœnicia and Egypt. The pyramids, the temples and palaces of Luxor and Karnac, "the trophied sepulchres of the kings," and the graven sarcophagi, afford full proof of the early advance of all the arts of design in Egypt. One great cause of this progress is the abundance of stone suited to ornamental architecture found in the mountain quarries near the Nile. These supplied blocks of such enormous size that columns and even colossal statues were usually finished and polished in the quarries, from whence they were drawn on an inclined road, levelled for the purpose, to the Nile, and then conveyed in boats to their place of destination. Few nations have equalled the Egyptians in the art of giving a polish to granite; specimens of their pillars now preserved in the British Museum exhibit a gloss and smoothness which has defied the effects of time and exposure. In the first engraving to this article three Egyptians are exhibited polishing a pillar, and as the process was performed entirely by the hand, it must have been both tedious and expensive.

Among the numerous monumental portraitures of the building art found on the walls of the Egyptian sepulchres, are some which explain to us a curious circumstance mentioned by the sacred historian in the account of the building of Solomon's Temple. It is recorded that "the house, when it was in building, was built of stone made ready before it was brought thither; so that there was neither hammer, nor axe, nor any tool of iron heard in the house, while it was in building." (1 Kings vi. 7.) This previous squaring and preparation of the stones is delineated frequently; the blocks are shown accurately measured under the superintendence of a principal architect, the shape into which it is intended that they should be cut being marked on the rough stone with a dark line so as to form an accurate guide to the stonecutter. When the block was finished it received a mark or number which pointed out the place it was to occupy in the building. Bishop Heber alludes to the previous preparation of the stones for the building of the Temple, in the following beautiful lines:

> . . . . . . In awful state
> The Temple rear'd its everlasting gate,
> No workman's steel, no ponderous axes rung,
> Like some tall palm the noiseless fabric sprung.

The walls of the palaces were inlaid with precious metals, ebony and ivory, elaborately carved. This custom was imitated by the Jews, for in the 45th Psalm, which prophetically refers to the union between Christ and his Church, but which primarily is a hymeneal ode on the marriage of Solomon with the daughter of the Egyptian Pharaoh, we find a reference to "the ivory palaces" prepared for the reception of that princess. (Psalm xlv. 8.) Menelaus, who visited Egypt on his return from Troy, is said by Homer to have decorated his palace at Sparta after the Egyptian fashion; hence Telemachus, who was only accustomed to the less luxurious edifices of Ithaca, could not restrain his admiration when he beheld the splendid walls and ceilings of his Spartan host. He thus addresses Pisistratus,—

> View'st thou unmoved, O ever honour'd most,
> These prodigies of art and wondrous cost?
> Above, beneath, around the palace shines
> The sumless treasures of exhausted mines;
> The spoils of elephants the roofs inlay,
> And studded amber darts a golden ray.
> Such, and not nobler, in the realms above,
> My wonder dictates is the throne of Jove.—*Odyssey*, iv.

According to Lucan, the Ptolemies revived all the ancient splendour of the Pharaohs in their palatial edifices. His description of the banqueting-hall of Cleopatra gives us some very interesting information respecting the extent to which these expensive decorations were carried, and it will serve to give some notion of the gorgeous palace erected by Solomon, which was built after the model of the Egyptian Pharaohs.

> Rich as some fane by lavish zealots rear'd,
> For the proud banquet stood the hall prepared;
> Thick golden plates the latent beams infold,
> And the high roof was fretted o'er with gold;
> Of solid marble all the walls were made,
> And onyx e'en the meanest floor inlaid;
> While porphyry and agate round the court
> In massy columns rose, a proud support;
> Of solid ebony each post was wrought,
> From swarthy Meroë profusely brought;
> With ivory was the entrance crusted o'er
> And polish'd tortoise hid each shining door;
> While on the cloudy spots enchased was seen
> The lovely emerald's never-fading green.—*Pharsalia*, x.

The art of sculpture was governed by very strict rules: there were fixed proportions established for every figure, which the statuary was not permitted to violate; and hence arises the great sameness in the Egyptian statues, and the stiffness for which they are all remarkable.

Isaiah describes the process of idol-making very minutely. "The carpenter stretcheth out his rule; he marketh it out with a line; he fitteth it with planes, and he marketh it out with the compass; and maketh it after the figure of a man, according to the beauty of a man; that it may remain in his house." (Isai. xliv. 13.)

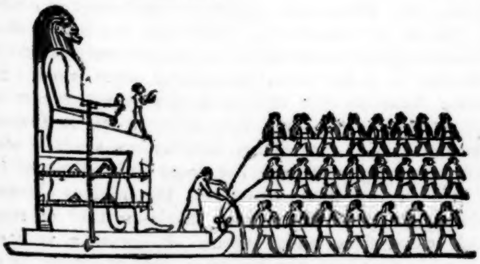
The mode of proceeding will easily be understood by a reference to the accompanying engraving. When a proper block of marble or granite had been procured by the sculptor, the surface was first smoothed, and parallel lines drawn from top to bottom; other lines were then drawn, at equal distances, from side to side, so as to divide the whole into a series of squares. The size of these squares was proportioned to the size of the figure, but the number of them was invariable, whatever might be the dimensions of the figure: nineteen of these squares, according to some authorities, and twenty-one and one-fourth according to others, were allowed for the height of the human body: when smaller figures, or ornaments, were introduced, the squares were subdivided into smaller squares, proportioned to the less figure. The outline was then traced, and its proportions were invariable: this, which to moderns would seem the most important part of the process, required no great exertion of skill in the Egyptian artist. It was then inspected by the master-sculptor, who wrote on various parts of it, in hieratic characters, such directions as he thought it necessary to give to the inferior artists who actually cut the figure. The colossal statue on which the workmen in the accompanying engraving are engaged, appears so far advanced towards completion that the instructions of the master-sculptor have been chiselled away. We are informed by Diodorus Siculus, that the most eminent statuaries always went to reside for a time in Egypt, as modern artists do in Italy, to study the principles of their art. He particularly mentions Telecles and Theodorus, the sons of Rhœcus, who made the celebrated statue of the Pythian Apollo at Samos, after, what he calls, "the Egyptian fashion." He explains this fashion to be the separate execution of the parts, for the statue was divided into two parts, at the groin: one half was cut by Telecles at Samos, and the other by Theodorus at Ephesus; yet, when they were joined together, they fitted so exactly that the whole seemed the work of one hand. And this seemed the more admirable, when the attitude of the statue was considered, for it had its hands extended, and its legs at a distance from each other, in a moving posture.

We thus see that Egyptian sculpture was almost

wholly a mechanical process; the laws of the country prohibited the intervention of novelty in subjects considered sacred; and, the more effectually to prevent the violation of prescribed rules, it was ordained that the profession of an artist should not be exercised by any common or illiterate person. Mr. Wilkinson, indeed, has shown the great probability of the higher artists having been included in the ranks of the priesthood. In some instances, however, we find reason to believe that the Egyptian artists broke through these trammels. In the two granite statues of lions presented by Lord Prudhoe to the British Museum, we perceive a boldness and freedom of execution scarcely compatible with a strict adherence to mechanical rule. This rejection of the rigid Egyptian standard may perhaps, be ascribed to the fact of these statues having been sculptured in Upper Egypt, where the conventional rules of caste appear to have been less strictly observed than in the vicinity of Thebes and Memphis. The earlier statues of the Egyptian artists, so far as their age has been ascertained, seem to possess more freedom, though less minute finish, than those of a more recent date.

One great impediment to the progress of Egyptian art was the preference shown for colossal statues, some of which were of so stupendous a size, that even in the present day, with all the mechanical contrivances of modern ingenuity, we should view the transport of such masses as a difficulty that could scarce be surmounted. But, from the representation we have copied in the accompanying engraving of a colossal statue removed from the place in which it was wrought to that which it was destined to occupy, it appears that the Egyptians used human force only, and supplied their want of mechanical facilities for transport by employing a vast number of labourers.

We see that the colossus was mounted on a sledge and drawn along a species of railroad, previously levelled, by mere human force. A man stands on the front of the sledge pouring oil, or water, on the rails, to facilitate the transit, while another, standing on the knees of the statue, beats time with his hands, in order that all the workmen should pull together. On these occasions there was a general holiday along the road by which the statue passed; crowds of priests and warriors formed a procession in front, shouting and waving branches of palm; while relays of labourers followed behind, ready to take the places of those who might become weary. The whole representation gives a very vivid impression of the perverse idolatry of the Egyptians, and adds fresh force to the prophet's denunciation: "Thus said the Lord God; I will also destroy the idols, and I will cause their images to cease out of Noph (Memphis); and there shall be no more a prince of the land of Egypt: and I will put a fear in the land of Egypt." (Ezek. xxx. 13.)



COLOSSAL STATUE DRAWN TO ITS PLACE.

A GOOD man submits his mind to the Governor of the whole universe, as good citizens do theirs to the law of the city.—EPICTETUS.

WILL nothing but what God willeth, and then who can be able to hinder thee?—EPICTETUS.

THE FREEZING OF THE RIVER NEVA.

THE River Neva, on which St. Petersburgh is situated, may be more properly considered a strait than a river. Its medium breadth is about fifteen hundred feet, while its depth in the channel is about fifty feet. It is the grand and only outlet for the waters of four great basins, each of which has an extensive natural reservoir of its own These reservoirs are the Lakes Onega, Ilmen, Saima, and Ladoga, the last mentioned being the largest lake in Europe, and receiving the superabundant waters of the other three, as well as of thirteen other streams. From such an immense accumulation of waters it is to be expected that there should be an enormous volume of water poured into the Gulf of Finland, by means of the Neva; and accordingly it has been estimated, by careful scientific measurement, that this river discharges upwards of 116,000 cubic feet of water in a second, with a velocity of about thirty-seven inches per second.

That such a body of water in rapid motion should be covered every year with a sheet of ice three feet thick, and often more, appears at first sight a very remarkable circumstance, and in order to understand it, three points have to be considered; *i. e.*, that St. Petersburgh, although not the most northern of capitals, is ascertained to be the coldest; that drift-ice is sent down in great quantities from the Ladoga; and that the winter is of very long duration.

The River Neva, at St. Petersburgh, divides itself into several branches, and across these are bridges of boats, for the purpose of communication between the two shores. Over the main trunk of the river there are also two of these bridges, one of which is on pontoons, and is managed with skill and celerity. It is nine hundred and twenty-four feet long, and is formed of fifteen pontoon boats. This bridge being cast loose at both ends, swings round against one side by the current, in about a quarter of an hour, and by means of capstans and warps is replaced in about two hours. The other cannot be managed so easily, on account of its great length, which is 2730 feet.

About the middle of November, the drift-ice is generally sent down from the Lake Ladoga. So sudden and so severe is the cold, that a cake of ice, from two to five inches thick, is formed round the edges of the northern lakes in twenty-four hours, which is almost as soon broken up by the storms to which those lakes are subject. This event is immediately announced to St. Petersburgh by telegraph. The police are then on the look-out for the appearance of the first flakes of drifted ice on the river, which is the signal for removing the bridges of boats. A resident at St. Petersburgh states, that when large sheets of ice floating down the river announce the setting in or the winter, the shorter bridges are frequently removed for a time to allow of the passage of these flakes, and then replaced, to the great inconvenience of the inhabitants of the capital. Vehicles of all descriptions are crowded together on the banks, while large boats, loaded with passengers, are seen forcing their way through shoals of drifting ice, by which they are often carried down a considerable distance. At length it becomes impossible to replace the bridge, and after a time, the passage for boats becomes more and more difficult, and is suspended altogether.

Great is the inconvenience to the capital in the interval between the removing of the bridges and the secure establishment of a road of ice across the stream. Some idea of this may be gained by supposing the river of our own metropolis to be destitute of permanent bridges, and that a similar degree of cold prevailed here. The suspension, even for a few days or a week, of the traffic which is now going on between the two shores of the Thames, would be a most serious matter; and to the inhabitants of St. Petersburgh the first freezing of the Neva is not less so. Until the ice is sufficiently thick to allow the traffic to be renewed, the inhabitants of the

city are not only cut off from ordinary intercourse, but from all communication with the Exchange, the Customhouse, the Academies of Sciences and the Fine Arts, the Corps of Cadets of the army and navy, and other government offices, and the principal cemeteries, which are all in the Vasili Ostroff or Island, a suburb of St. Petersburgh, as Southwark is of London.

The time which is occupied before the river becomes securely frozen, depends very much on the nature of the drift ice sent down by the lake. If this has been broken into small pieces, these sometimes pass on to the gulf without encumbering the river, so that when they are all gone by, the bridge can be replaced, and things remain as before until the arrival of a fresh quantity. But if, on the contrary, the masses of ice are large, they get wedged together so firmly that they remain fixed themselves, and prevent the progress of the succeeding masses. Sometimes a violent wind will break them up, and again clear the river; but if this is not the case, the communication becomes wholly interrupted, for these masses are so fixed together as to leave large open spaces, which are very dangerous, because a thin plate of ice soon forms over them, causing them to appear like the more solid ice, while they are really insufficient to support even a foot-passenger. However, there is in a short time a sufficient thickness of ice to allow of the passage of pedestrians, who are then seen crossing the river in all directions, and in a few days more the passage is considered safe for carriages and sledges. Broad roads are then marked off by rows of fir branches placed upright, and slopes are made of planks from the quays to the ice. The river now looks like a wide and snowy valley, while the unceasing passage of carriages, sledges, merchandize, pedestrians, and troops, effectually removes the idea of the mighty stream that is rolling underneath them. This state of the river generally lasts for about five months, the general period of the breaking up of the ice being from the 5th to the 15th of April.

The great advantage which St. Petersburgh would gain in the possession of a permanent bridge, is sufficiently evident; but several circumstances unite to render it very difficult to construct one. The occurrence of the ice, the great depth of the river, and the fact that the only spot where it would be possible to build one is at a point below the dock-yards, are mentioned as the chief obstacles. A suspension bridge has been proposed by an able engineer, the design of which is very magnificent, and it is said that if executed, it would present one of the grandest monuments of the kind in the world. "The property in the Vasili Ostroff would double in value, and the inhabitants of the capital in general, while they possessed the inestimable advantage of uninterrupted communication, would enjoy the proud spectacle of their country's history, traced in the bas-reliefs of metal on the towering supports of the chains, presenting a façade of one hundred and four feet high."

THEY say of poets, they must be born such: so must mathematicians, so must great generals, and so indeed must all other denominations of men, or it is not possible they should excel. But with whatever faculties we are born, and to whatever studies our genius may direct us, studies they must still be. I am persuaded that Milton did not write his *Paradise Lost*, nor Homer his *Iliad*, nor Newton his *Principia*, without immense labour. Nature gave them a bias towards their respective pursuits, and that strong propensity, I suppose, is what we mean by genius. The rest they gave themselves.—COWPER.

POETRY reveals to us the loveliness of Nature, brings back the freshness of youthful feeling, revives the relish of simple pleasures, keeps unquenched the enthusiasm which warmed the spring-time of our being, refines youthful love, strengthens our interest in human nature, by vivid delineations of its tenderest and loftiest feelings, and through the brightness of its prophetic visions, helps faith to lay hold on the future life.

PLANT-LIKE ANIMALS.

VI.

Fig. 1.

Holothuria tubularia,
(With two of the tubercles magnified.)

IN collecting some further notices of the curious race of animals, to which we have on several occasions directed the attention of our readers, we take those which remind us of the Cactus tribe among plants. Strange and uncouth are some of the forms of cactus, and it will be owned that there is nothing very pleasing in the appearance of the animal above represented, which our fancy leads us to assimilate with them.

The *Holothuriæ* are natives of every sea, but they are particularly abundant in the Mediterranean. Some of the more remarkable species seldom come under the notice of the zoologist, on account of the great depths which they frequent, but there are others that lurk among the sea-weed, or in the crevices of the rocks, or even make holes in the sand for their habitation. They move with great reluctance, and at an extremely slow rate. In order to convey themselves from one place to another, they put forth from their mouths a bundle of tentacula or feelers, which they fix firmly on the ground, and then drag the body afterwards "at a pace slower than the shadow on the dial." By means of these feelers also, they retain themselves in one position, and keep at anchor when the sea is rough and stormy. It appears that these animals have also the power of inflating the body, and of moving their feelers so as to support themselves on the water. They swim slowly, and move their bodies in the manner of a worm.

One of the species of Holothuria is a luxury among Chinese epicures, though it is not precisely ascertained whether it is the individual above represented. Professor Jameson tells us that it is very extensively used for culinary purposes. The Chinese call it *Trepang*, and make of it rich soups, and various kinds of stews. After being cleaned and the water pressed out of it, it is laid in dry lime, called by the natives *Chanam;* afterwards it is either dried in the sun, or on stages, with wood fires under them. It forms a very considerable article of the Indian exports to China, so that there are fisheries of trepang at every country of the Indian Archipelago, from Sumatra to New Guinea. It has also been found in Ceylon and the Isle of France, and sent thence to China, and though from inexperience the inhabitants of those islands prepare it in a very inferior manner, it also finds a ready market.

The importance of this little animal in a commercial point of view, will be seen by the following facts gathered from the same authority. "The whole

quantity of trepang sent to China from Macassar, and other parts of India, may be estimated at fourteen thousand piculs Taking this quantity at the low average of forty dollars a picul, and valuing the dollar at 4*s.* 3*d.*, its entire value in a commercial view is 119,000*l.* Notwithstanding this enormous export to China, we do not understand that its value in the market has ever been materially affected by the quantity imported; an evident proof that the demand of the market still exceeds the supply. The Celestial Empire cannot exist without its trepang and bird's nests."

There is a most extraordinary circumstance connected with the economy of the Holothuriæ, which the testimony of the most respectable observers alone enables us to believe. It is well stated by the writer of the elaborate article "Zoophytes," in the ***Encyclopædia Britannica.*** "When a Holothuria is placed in a basin of sea-water, it has been seen to emit jets of water from the posterior aperture at regular intervals, the jets succeeding each other, at not more than a minute's interval. This water is undoubtedly what has been rendered injurious by its stay and use in respiration, mixed probably with a considerable portion from the intestine. But when the water in the basin has become impure, these jets become also less regular; and after evidence of uneasiness, and some unusual motions, the worm will at length vomit up its tentacula, its oral apparatus, its intestine entire and with its appendages, and a large cluster, if not the whole of the ovaries. And after this complete embowelling, the animal lives for at least six or seven hours; for the empty skin shows by its motions, that nearly all its irritability remains, and even its power of locomotion is not lost. Sir John G. Dalyell, has even proved, by actual experiment, that if this poor embowelled worm is supplied with fresh sea-water at proper intervals, it will live to replace all its viscera with new growths, reproduce new tentacula, new teeth, a new stomach and intestine, and all its complicated aquiferous system, so as to be in every respect as it was previous to its wonderful evomition."

The Holothuriæ belong to Cuvier's great class ***Echinodermata***, order ***Pedicellata.*** The form of the body is generally that of an elongated cylinder or pentagon, and the skin is sometimes scaly, like that of a fish, often of an earthy colour, or white with red spots. The shape of the body is extremely changeable in the same species. If placed in a vessel of sea-water it assumes as many varieties of size and length as a leech. This change of form in the Holothuria is said to be dependent on the action of two kinds of muscles which enter into the composition of the skin; one set forming a series of transverse parallel fibres, lining its inner surface; the other set stretching lengthwise, either in pairs or at equal distances.

Fig. 2.

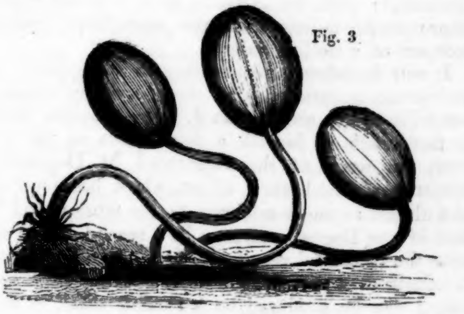
Pyrosoma elegans.

Belonging to another class is the curious species, which we may also liken to a cactus, and of which fig. 2 gives a representation, rather ***smaller*** than nature.

Although there is nothing in the appearance of the cylinder to convey such an idea, this mass is really composed of a great number of small animals, who unite together in this form, and swim in the ocean by their combined contraction and dilatation. Large species are often observed in the Mediterranean, arranged without much regularity. In the open sea, they assemble in considerable masses, and exhibit a sparkling phosphoric light. From the manner in which the masses are disposed in cordons, a most lively appearance is sometimes given to the sea by their phosphoric effect, resembling long trains of fire. A singular phenomenon is also attached to this phosphorescence, that is, that the colours vary instantaneously, passing from lively red to crimson, orange, green, azure-blue, and finally to an opaline yellow, when the mass appears to be in a state of repose.

These curious animals belong to the class ***Acalepha***, order ***Nuda***, as do also the following, which are attached to rocks and other bodies, and are deprived of all power of locomotion.

Fig. 3



Ascidia globifera.

Several of the species (of which this is one) are remarkable for the long stalks on which they are supported. They exhibit signs of life chiefly by absorbing and evacuating water. When alarmed they eject it to a considerable distance.

In considering the state of our knowledge as to the department of natural history to which these and similar animals belong, there is sufficient to humble the most diligent inquirer. The varieties among these minute inhabitants of the seas seems absolutely boundless, and it appears as if there had been scarcely a step taken by the united efforts of human industry and reason. Dr. Macculloch found in two or three days twenty undescribed species of zoophytes, and doubtless every one who would take the pains to search, would also find that much as we are indebted to zoologists for the labour with which they have classed and arranged these animals, yet that the number of unknown species is still incalculable. The view of our own ignorance should lead us often to contemplate the Divine Omniscience; but this is "to range, in imagination, the endless, boundless universe; to examine every sphere of incalculable millions; with all the mechanical actions and mathematical laws under which order is preserved; to consider every atom in each of these, and every action which is for ever taking place among them. It is, again, to bring before the mind the entire mass of the forms of organic being by which those are inhabited, and every individual in that mass, with every detail of the structure and proceedings of each, and every portion of the moral governments appointed for them, to the very individualities of their separate mental powers. The imagination cannot do this for our own globe, nor for the smallest portion of our own earth: and though it should have done it for the whole universe, it has but commenced."

It cannot be reckoned unfair to desire men, freely to give to others the liberty which they allow to themselves, if they would prove that their love of liberty is genuine and sincere.—Milner.

ON DIORAMIC PAINTING.

I.

The advantage of a picture over a written description is to be found, says Addison, "in the real resemblance which a picture bears to its original, which letters and syllables are wholly void of. Colours speak all languages, but words are understood only by such a people or nation."

There are but few *pictorial descriptions* more beautiful than those presented by the Diorama. In these remarkable paintings we more than realise the scenes which they are intended to present: we read the poetical language which always accompanies the successful results of the painter's art; we enjoy the harmonies of nature in the alternate effects of night and day; sunshine and shade gradually stealing over them; we are impressed with the solemnity of the Cathedral interior as the shades of evening fall slowly upon it, and it becomes resigned to solitude and gloom; objects again become visible as a few scattered lamps cast their feeble rays, and figures appear to occupy the vacant seats. These effects produced by the decomposition of form are highly successful; such, for instance, as in a recent exhibition, where rocks falling from the mountains replace the prospect of a smiling valley.

It will doubtless be interesting to the general reader to become acquainted with the means by which such beautiful effects are produced. We propose, therefore, in this article to furnish a few details on the subject, from the work of the celebrated M. Daguerre, the inventor of this branch of art, which has acquired for him almost as much celebrity as the more useful invention of the Daguerreotype. In a second article we will state the successful results of Mr George Tait's attempts to construct a *portable* diorama, whereby these peculiar effects can be produced on a smaller scale, so as to be at the command of the amateur in painting.

The diorama is a painting fitted up so as to receive light both in front and behind; so that by the full or partial admission, or the total exclusion, of one of these sources of light, a great variety of effects may be produced. No light is admitted to the eye except that which proceeds from the painting.

In Dioramic Painting the canvass is painted on both sides. Whether the subjects be illuminated by reflected or transmitted light the canvass must be very transparent, and the texture as smooth and equable as possible. Lawn or calico may be employed, but it must be manufactured of very great width, to avoid seams, which, when existing, can scarcely be concealed in the principal lights of a picture.

The canvass being properly stretched, it is primed on both sides with at least two coats of parchment size.

The first effect, which ought to be the clearer of the two, is executed on the right side of the canvass. The sketch is first made in black lead, taking care not to soil the canvass, the whiteness of which is the sole resource possessed by the artist for bringing out the lights of the picture; for white cannot be used in executing the first effect. The colours used by M. Daguerre are ground in oil, but laid upon the canvass with turpentine, to which a little animal oil is sometimes added, but only for deep shadows, and these may be varnished without injury. The method is exactly the same as in water-colour painting, with this difference only, that the colours are prepared with oil instead of gum, and applied with turpentine instead of water. The artist cannot employ white nor any opaque colour by coats, which in the second effect would occasion spots more or less tinted, according to the greater or less degree of opacity. He must endeavour to produce his effects at once—at a single stroke; because, by going over his work a second time, he injures the transparency of the canvass.

The second effect is painted on the wrong side of the canvass. In executing this, the artist must employ no other light than that which comes through the canvass, from the front part of the picture. The transparent forms of the first effect are thus seen; and these must either be preserved, or painted over according to the effect intended.

First, a wash of some transparent blue is put over the whole canvass. This coating, like the other colours, is prepared in oil, and laid on in turpentine. The marks of the brush are effaced by a huge tool of badger's skin. By means of this coating, the seams also to a certain extent are concealed by taking care to spread it thin along the selvages, which are always less transparent than the rest of the canvass. When this coating is dry, the alterations intended to be made in the first effect are sketched out.

In executing this second effect, the artist has nothing to do beyond modelling in light and shadow, without reference to local colour, or to the colours of the first picture, which are seen by transmitted light, as transparencies. This part is executed by means of a tint, of which white is the base, with which lamp-black is mixed in order to obtain a grey, the strength of which is ascertained by applying it to the wash of blue on the wrong side, and then viewing it from the right side of the picture, from which position it will not be at all perceptible if of the proper strength. The gradation of tones is produced by the greater or less opacity in this tint. It may happen that the shadows of the first effect interfere with the execution of the second. To remedy this inconvenience, and to conceal these shadows, their force can be harmonized by using the grey of a corresponding opacity, according to the strength of the shadows which it is the intention to destroy. It is necessary to urge this second effect to its utmost power.

When this general effect of light and shadow is finished on these principles, and the desired effect obtained, the picture may be coloured, the artist using only the most transparent tints prepared in oil. It is still a water-colour that is to be executed; but less turpentine must be used in these glazings, which produce a powerful effect only in proportion as they are repeated several times, and with more of oil than essence. But for slight effects of colour turpentine is sufficient.

The lighting up of the pictures. The first effect painted on the right or front of the canvass is lighted by reflection, that is to say, only by a light which comes from the front, while the second effect, or that painted on the wrong side, receives its light by transmission; that is, from behind only. In both effects both lights may be employed at once, in order to modify certain portions of the picture.

The light which gives effect to the painting in front should come from above. The illumination which falls upon the second effect—that painted behind, should proceed from vertical openings; it being always understood that these are to be completely closed when the first effect only is to be seen.

If it happen to be necessary to modify a portion in the first effect, or picture, by a light belonging to the second, that is, coming from behind, then this light must be inclosed so as not to fall except on the proper place. The windows or openings ought to be distant from the paintings at least seven or eight feet, in order to give a power of modifying the light by transmitting it through coloured media, as the exigencies of desired effects may demand. The same means are requisite for the first effect, or front picture.

To explain the principles upon which Dioramic paintings are executed and lighted up, M. Daguerre adduces the following experiment:—put upon a canvass two colours—the brightest possible—the one red, the other green, both, as near as may be, of the same intensity. Now, interpose a red medium, as a coloured glass, in the stream of light which falls upon them—what happens? The red colour reflects the rays which belong to it; the green reflecting nothing, (for it can only reflect green

rays, and none are present,) remains black. Reverse the experiment by interposing a green glass—the effect also is reversed; the green colour gives forth its proper reflection; the red is now black. The effects, indeed, are not perfect unless the interposed media completely exclude all rays but their own, a condition not easily obtained; for coloured media have rarely the power of excluding all but one ray. The general effect, however, is sufficiently determined.

To apply this principle to dioramic paintings, though in these paintings there are only two effects represented, one of day in front, one of night behind. These effects not passing the one into the other without a complicated combination of the media which the light had to traverse, produce an infinity of other effects similar to those which nature presents in her transitions from morning to night, and the reverse. It must not be imagined that it is necessary to employ media of very intense hues in order to obtain striking modifications of colour, for often a slight shade in the medium suffices to produce a very great change in the effect.

It will thus be seen how important it is to observe the aspect of the sky, in order to appreciate the tone of a picture, whose colouring matters are subject to great decompositions. The best light for this purpose, is that from a pale sky; for where the sky is blue, it is the blue tone of the picture also, and consequently its cold tone comes out most powerfully, while its warm hues remain inactive. Their media are not present, and they are cast comparatively back into neutral tints by the blue medium of the sky, so favourable to the cold tones of the picture. It happens on the contrary when the sky is coloured that the warm tones of the picture—its reds and yellows—come forth too vigorously, and, overpowering its colder tones, injure its harmony, or it may be, give it quite a different character—a warm instead of a cold tone of colour.

These remarks go to prove that the uniform intensity of colours cannot be maintained from morning to evening—a picture cannot be the same at all hours of the day. This, perhaps, is one of the causes which contribute to render good painting so difficult to execute, and so difficult to appreciate. Painters, led into error by the changes which take place between morning and evening in the appearance of their pictures, falsely attribute these alterations to a variation in their manner of seeing, and colour falsely, while, in reality, the change is in the medium—in the light.

There is danger in the indulgence of feelings, let them be even the highest and the holiest of our nature, without corresponding practice to prevent their degeneration into mere aimless impulses; and these aimless impulses are found but a weak protection against the temptations that assail us in this world.

It is true, indeed, that the Deity is more incomprehensible to us than anything else whatsoever, which proceeds from the fulness of his being and perfection, and from the transcendency of his brightness; but for the very same reason may it be said also, in some sense, that He is more knowable and conceivable than anything; as the sun, though by reason of its excessive splendour it dazzle our weak sight, yet is, notwithstanding, far more visible also, than any of the *nebulosæ stellæ*, the small misty stars. Where there is more of light, there is more of visibility; so where there is more of entity, reality, and perfection, there is more of conceptibility; such an object filling the mind more, and acting more strongly upon it. Nevertheless, because our weak and imperfect minds are lost in the vast immensity and redundancy of the Deity, and overcome with its transcendant light and dazzling brightness, therefore, hath it to us an appearance of darkness and incomprehensibility; as the unbounded expansion of light, in the clear transparent ether, hath to us the apparition of an azure obscurity; which yet is not an absolute thing in itself, but only relative to our sense, and a mere fancy in us.—Cudworth.

ON QUARRYING STONE.

A quarry is an excavation made in the ground, or among rocks, for the purpose of extracting stone for building, or for sculpture. The name appears to have originated in the circumstance that the stones, before they are removed to a distance, are first *quadrated*, or formed into rectangular blocks.

When the stone lies immediately below the surface, the first operation is to remove the earth, and lay bare the rock; but when the stone is inclosed within a hill or mountain, galleries are run into the ground, pillars of the material being left to support the superincumbent mass. Sometimes a vertical shaft is sunk, and the blocks are raised by means of a crane.

In quarrying sandstone, and those rocks which consist of regular layers, the pick, the wedge, the hammer, and the pinch, or lever, are the chief tools. But for many kinds of limestone, and for greenstone and basalt, recourse is had to the more violent and irregular effects of gunpowder. Indeed, some of the primitive rocks, such as granite, gneiss, and sienite, could scarcely be torn asunder by any other means.

The great objection to blasting by gunpowder is, that the blocks are broken irregularly, and much of the stone is wasted. Therefore, when the nature of the stone will permit, another method is adopted. A series of iron wedges are placed in a line, a few inches apart, on the natural face of the rock, and in the direction of what is called the *cleaving grain*, that is, a line parallel with the contiguous surfaces of the strata, in the direction of which the stones are more easily divided than in any other. These wedges are driven into the rock until a part becomes loosened. A channel is then cut in the direction of the length of the intended block, at a distance from the natural edge of the stone, equal to its required breadth; wedges are then driven into this channel until the stone is split in that direction also. In the hardest stones the wedges are not placed in the channels, but in *pool* holes, as they are called, sunk in the direction in which the block is to be severed from the mass. A similar operation is then performed in the direction of the breadth of the block; and thus a large portion is detached from the original mass. The blocks are then reduced as nearly as possible to a rectangular form, by means of a tool called a *kevel*, pointed at one end and flat at the other.

A simple and efficacious method is adopted in some parts of France, for splitting large cylinders of stone into mill-stones. Horizontal indentations or grooves are chiselled out quite round the cylinder, at distances corresponding to the intended thickness of the mill-stones, and into these indentations wedges of dry wood are driven. These are then wetted, or exposed to the night dew, and next morning the different pieces of stone are found separated from each other, by the expansion of the wood, consequent on its absorption of moisture; "an irresistible natural power thus accomplishing, almost without any trouble, and at no expense, an operation which, from the peculiar hardness and texture of the stone, would otherwise be impracticable but by the most powerful machinery or the most persevering labour."

When this method of separating the blocks from the quarry is not available, on account of the hardness of the rock, gunpowder is used. This substance is simple in its application, and powerful in its effects. The grains of powder are suddenly converted into a permanently elastic air, occupying about four hundred and seventy-two times more space than their own bulk. The elastic fluid expands with a velocity calculated at the rate of about ten thousand feet per second, and its pressure or force, when thus expanding, has been estimated as equal to one thousand atmospheres, that is one thousand times greater than the atmospheric pressure upon a base of the same extent. By applying this product to a square inch, upon which the atmosphere

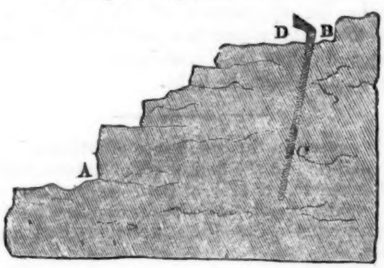
exerts a pressure of about fifteen pounds, the elastic fluid of the gunpowder will be found, at the moment of explosion, to exert a force equivalent to six tons and a half upon the square inch of surface exposed to it; and that with a velocity which the imagination can hardly follow.

In boring a rock preparatory to blasting, it is necessary to consider the nature of the stone, and the inclination or dip of the strata, in order to decide upon the diameter, the depth, and direction of the hole for the gunpowder. The diameter of the hole may vary, according to the nature of the rock, from half an inch to two and a half inches; and the depth from a few inches to as many feet: the direction may vary to all the angles from the perpendicular to the horizontal. The tools used in this operation are very simple. The chisel, or *jumper*, as it is called, varies in size according to the work to be performed, and its edge is more or less pointed to suit the hardness of the rock to be bored. If the hole is to be small and not deep, it may be bored by a single person; with one hand he manages the chisel, which he turns at every blow so as to cross the previous cut, and with the other hand he strikes it with a hammer of six or eight pounds weight, occasionally clearing out the hole by means of a *scraper*. But when the hole is large and deep, one man in a sitting posture directs the jumper, pours water into the hole, and occasionally cleans it out, while two or three men, with hammers of ten or twelve pounds' weight, strike successive blows upon the jumper, until the rock is perforated to the desired depth. To prevent annoyance to the workmen a small rope of straw or hemp is twisted round the jumper, and made to rest in the orifice of the hole. When the holes are to be made to a greater depth than about thirty inches, it is common to use a chisel from six to eight feet in length, pointed at both ends, having a bulbous part in the middle for the convenience of holding it; it thus becomes a kind of double jumper, and is used without a hammer, with either end put into the hole at pleasure. The workmen holding this jumper by the bulbous part, lift it, and allow it to drop into the hole by its own weight, and by this simple operation a hole to the depth of five feet and upwards is perforated with ease and expedition. When the boring is completed, the fragments are carefully removed, and the hole is made as dry as possible, which is done by filling it partially with stiff clay, and then driving into it a tapering iron rod, called the *claying bar*, which nearly fills it. This being forced in with great violence, drives the clay into all the crevices of the rock, and secures the dryness of the hole. Should this plan fail, tin cartridges are used; these are furnished with a stem or tube, as shown in the following figure, through which the powder may be ignited. When the hole is dry, the charge of powder is introduced, mixed sometimes with quicklime, which, it is said, increases the force of the explosion. A long iron or copper rod, called the *pricker*, is then inserted amongst the powder, and is afterwards withdrawn, when the priming powder is introduced. The hole is filled up with burnt clay, pounded brick, stone, or any other substance not likely to produce a spark during the ramming. This is called the *tamping*. In filling up the hole, the chief danger is the production of a spark among the materials, a circumstance which has occasioned the most fatal and distressing accidents to quarriers. Prickers and rammers of copper, or of bronze, have been employed, but their greater expense, and liability to twist and break, have prevented their general introduction.

The quarrier is, of course, accustomed to suppose that the more firmly he rams in the powder the greater will be the resulting effect. It is, however, a curious property of sand, that it fills up all the void spaces in the tube or hole, and for some rocks entirely supersedes the necessity of ramming and pricking.

When the hole is fully charged with the powder and wadding, the pricker is withdrawn, and the small tubular space, or vent-hole, which it leaves, is sometimes filled up with powder; but, for the sake of economy, it is more common to insert straws filled with powder, and joined together, so as to reach the required depth. The lower straw is one terminating in the root part, where a natural obstruction occurs, or it is artificially stopped with clay to prevent the powder from being lost. The lower part of the priming straw is pared quite thin, so as to insure the inflammation of the charge of powder in the hole. Sometimes the fire is conveyed by means of the large and long green rushes, which grow in marshy ground. A slit is made in one side of the rush, along which the sharp end of a bit of stick is drawn, so as to extract the pith, when the skin of the rush closes again by its own elasticity. This tube is filled up with gunpowder; it is then dropped into the vent-hole, and made steady with a bit of clay. This being done, a slow match, called a *smift*, consisting generally of a bit of soft paper, prepared by dipping it into a solution of saltpetre, is carefully applied to the priming powder. When this match is about to be fired, the quarriers usually blow a horn or ring a bell, to give notice to all around them to retire. The explosion commonly takes place in about a minute: the priming first explodes, attended only with flame; a short interval of suspense commonly ensues; the eyes of the bystanders being anxiously directed towards the spot; the rock is instantly seen to open, when a sharp report or detonating noise takes place, and numerous fragments of stone are observed to spring into the air, and fly about in all directions, from amidst a cloud of smoke. The quarrier then returns with alacrity to the scene of his operations.

The accompanying figure shews the plan of blasting the rock, and a section of the hole ready prepared for firing. The portion of the rock to be dislodged by the explosion is that included between A. and B. The charge of powder is represented as filling the bore to C, from which point to the top, the hole is filled up with *tamping*. The *smift* is represented at D.



In the year 1831, a patent was taken out by Mr. Bickford, of Tucking Mill, Cornwall, for an invention called "the Miner's Safety Fuse." It consists essentially of a minute cylinder of gunpowder, or other suitable explosive mixture, enclosed within a hempen cord, which is first twisted in a peculiar kind of machine, then overlaid to strengthen it; afterwards it is varnished with a mixture of tar and resin to preserve the powder from moisture, and finally is coated with whitening to prevent the varnish from sticking to the fingers, or the fuses to one another. These fuses are said to have been used with good effect, and to have greatly diminished the number of accidents.

A French philosopher, whose writings are voluminous, being asked how he could find time to finish so many works, replied, "By *not* living in Paris."

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